

Innovative Antenna Arrays Enabling Continuous Interceptor Communications

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The official link for this solicitation is:

<http://www.acq.osd.mil/osbp/sbir/solicitations/sbir20152/index.shtml>

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Description:

Phased antenna arrays are expensive, heavy systems with complex hardware configurations. Despite these complexities, phased arrays are advantageous in situations where mechanical steering is impractical. In the past decade, there has been maturation in technology regarding the use of digital beamforming (DBF) to substantially augment the system-level capabilities of phased array antennas. However, disadvantages of this “work-around” include potential high power consumption, data latency and throughput introduced by digitization and beamforming operations. This topic solicits ideas to develop radio frequency antennas that are innovative, reliable, radiation hardened, and support high speed continuous communications between fire control and interceptor/kill vehicles in an operational fading channel environment throughout all stages of flight without reorientation requirements. Proposed communications schemes should have the lowest possible weight impact on the kill vehicle. Favorable solutions will consider multiple communication paths including communication terminals, satellites, and with scalable transmission power and ranges. Reduction in the antenna array footprint on the kill vehicle is also desired including flexible ultra wideband, conformal, and fractal antenna solutions that are capable of receiving signals from a large range of orientations. PHASE I: Conduct an initial design evaluation of proposed systems and perform any laboratory/breadboard experimentation or numerical modeling needed to verify the proposed method. The contractor should identify the strengths/weaknesses associated with different solutions, methods and concepts. PHASE II: Based on the optimal communication antenna array

design proposed in Phase I, the contractor should complete a detailed prototype design incorporating government performance requirements. Fabricate and test a prototype for hardness, reliability, and performance in a simulated environment to verify theoretical/design assumptions. The final deliverable will be a detailed performance analysis of the experiment, an antenna prototype, and an initial design of an engineering development model of the resulting communications system. The contractor should coordinate with solicitor during prototype design and development to ensure products will be relevant to ongoing and planned projects. PHASE III: Either solely, or in partnership with a suitable production foundry, implement and verify in full scale that the Phase II demonstration technology is economically viable. Assist solicitor in transitioning the technology to the appropriate system or payload integrators for engineering implementation and testing. Develop and execute a plan for marketing and manufacturing. Commercialization: Innovations developed under this topic will benefit both DoD and commercial space and terrestrial programs. Possible uses for these products and techniques include long-range line-of-sight communications systems for satellites or aircraft.